L-system Turtle Graphics (part 1)

- In Scratch, we wish to create the following:
    1. A turtle sprite (from bird's-eye view)
    2. Use keyboard buttons to control the turtle using the following moves:
        - W = Move forward
        - D = Turn right
        - A = Turn left
        - S = Hop forward (and do not draw)
        - E = Save position at top of list
        - Q = Return to top-of-list position and delete position from list

Start a new project

1. Go to https://scratch.mit.edu
    - Login to save your work.
    - `Create` a new project.
2. Click on `Costumes` to edit the cat.
    - Delete the 2nd costume.
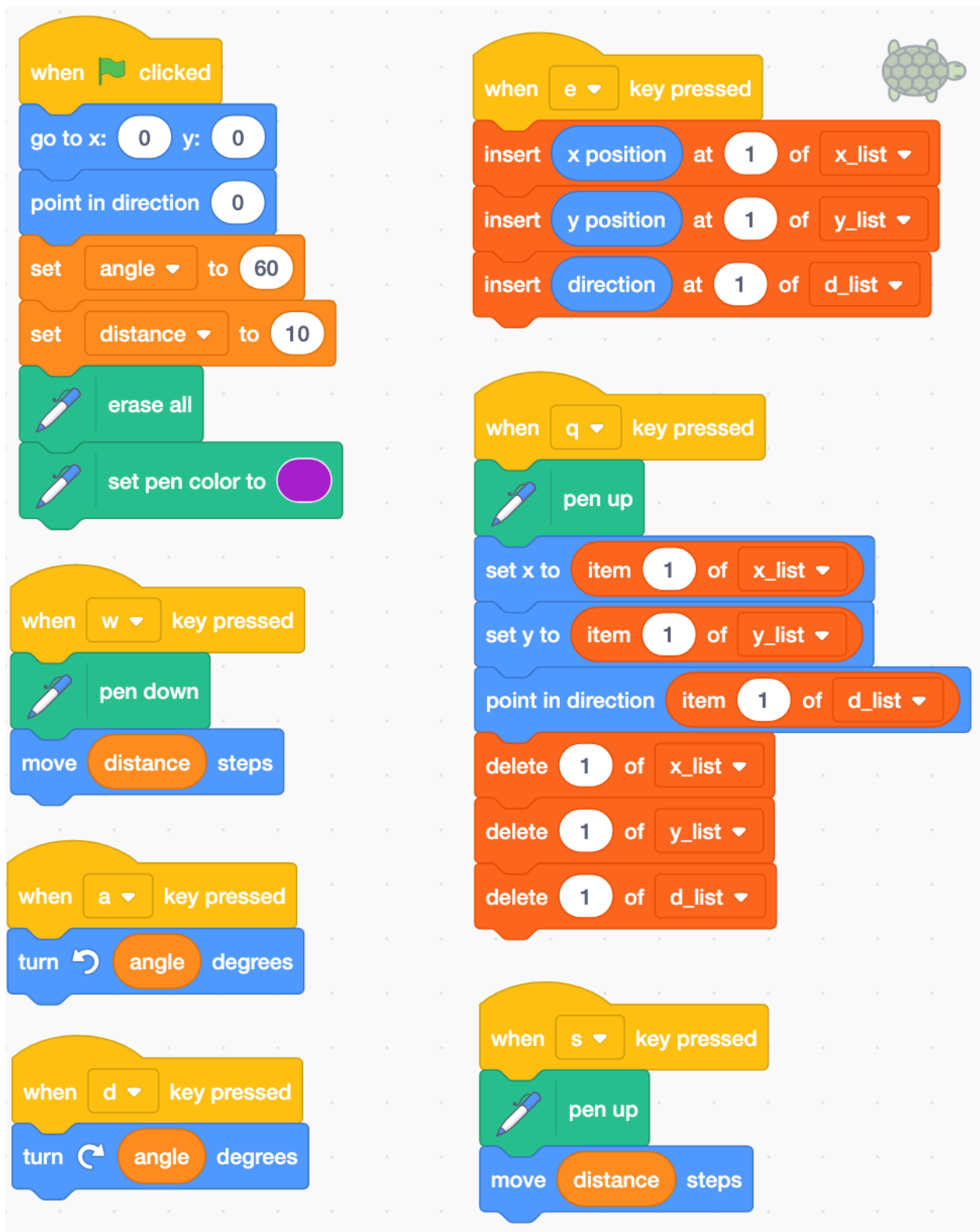   - Change the 1st costume to look like the following turtle:
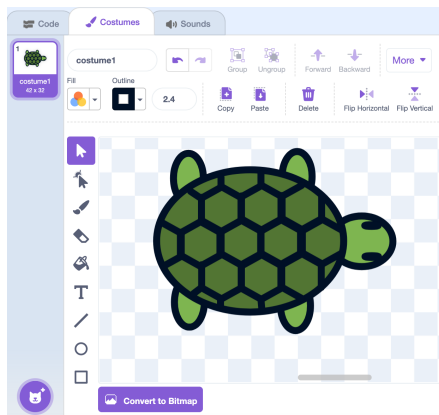
3. Make the following variables and lists:
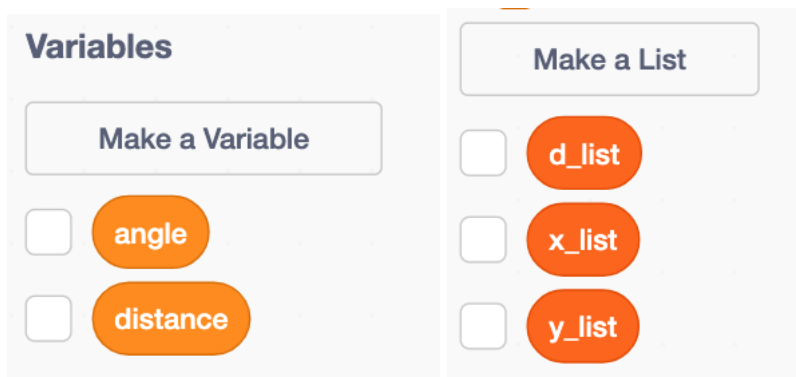
4. Add the Pen extension! (Purple button in bottom right).

5. Write the code:

```
when [flag] clicked
go to x: (0) y: (0)
point in direction (0)
set [angle ▼] to (60)
set [distance ▼] to (10)
erase all
set pen color to (●)
```

```
when [w ▼] key pressed
pen down
move (distance) steps
```

```
when [a ▼] key pressed
turn ↺ (angle) degrees
```

```
when [d ▼] key pressed
turn ↻ (angle) degrees
```

```
when [e ▼] key pressed
insert (x position) at (1) of [x_list ▼]
insert (y position) at (1) of [y_list ▼]
insert (direction) at (1) of [d_list ▼]
```

```
when [q ▼] key pressed
pen up
set x to (item (1) of [x_list ▼])
set y to (item (1) of [y_list ▼])
point in direction (item (1) of [d_list ▼])
delete (1) of [x_list ▼]
delete (1) of [y_list ▼]
delete (1) of [d_list ▼]
```

```
when [s ▼] key pressed
pen up
move (distance) steps
```

6. Make the turtle sized small (just big enough to see it is a turtle in fullscreen mode).

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7. Make a drawing!
   - Go to fullscreen mode.
   - Click the green flag to Go.
   - Type the following keys on your keyboard:

EWEA WSWQ EDWS WQWE AWEA WSWQ EDWS WQWS SWEA WSWQ

EDWS WQWQ EDWE AWSW QEDW SWQW SSWE AWSW QEDW SWQW

QWEA WSWQ EDWS WQWQ EDDW EAWS WQED WSWQ WEAW EAWS

WQED WSWQ WSSW EAWS WQED WSWQ WQED WEAW SWQE DWSW

QWSS WEAW SWQE DWSW QWQW EAWS WQED WSWQ WQEA AWEA

WSWQ EDWS WQWE AWEA WSWQ EDWS WQWS SWEA WSWQ EDWS

WQWQ EDWE AWSW QEDW SWQW SSWE AWSW QEDW SWQW QWEA

WSWQ EDWS WQWQ SSSS SSSS SSSS

8. **Submit** a screenshot of the drawing **on Canvas** under assignment Scratch: L-sys Turtle pic 1.

9. Make your own drawing!
    - Return to the code. Edit the distance, angle, and initial position.
    - Adjust the keys to whatever you want.
    - Add a key that changes the color.
    - Return to fullscreen.
    - Restart by hitting the green flag. (`Go.`)
    - Control the turtle to make a drawing.
10. **Submit** a screenshot of your drawing **on Canvas** under assignment `Scratch: L-sys Turtle pic 2`.